PROJECTILE MOTION CALCULATOR

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In this exercise you will investigate how the angle of firing (inclination) affects the distance that a projectile travels (range), its maximum height, and how long it is in the air.

Go to the Phet site noted below. Click on download and then look for the file to appear in the lower left hand corner.

Open the file and investigate the following firing conditions noted in the data table. Fill in the data table.

When you have finished this exercise without air resistance, you are to **repeat it with air resistance** and fill in the last two columns. <https://phet.colorado.edu/en/simulation/projectile-motion>

Questions for understanding:

1. What angle produces the greatest height?

2. Was this true with and without air resistance?

3. What angle produced the greatest range?

4. Was this true for both conditions (with air resistance and without)

5. What angle produced the longest time of flight? Was this with or without friction?

6. What is the name of the path of a projectile?

7. What is definition of a projectile?

8. What are the two components of a projectiles flight pattern?

9. What are the characteristics of the component in the x direction?

10. What are the characteristics of the component in the y direction?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | WITHOUT AIR RESISTANCE | | | | WITH AIR RESISTANCE | | |
| Angle (degrees) | Initial velocity | Height (m) | Range (m) | Total time (s) | Height (m) | Range (m) | Total time (s) |
| 15 | 18 |  |  |  |  |  |  |
| 25 | 18 |  |  |  |  |  |  |
| 35 | 18 |  |  |  |  |  |  |
| 45 | 18 |  |  |  |  |  |  |
| 55 | 18 |  |  |  |  |  |  |
| 65 | 18 |  |  |  |  |  |  |
| 75 | 18 |  |  |  |  |  |  |

Alternate sites: <http://www.calctool.org/CALC/phys/newtonian/projectile>

simulator: <http://www.splung.com/content/sid/2/page/projectiles>